Resume

Yaroslav Ryabov

CONTACT INFORMATION

National Institutes of Health
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RESEARCH INTERESTS

Applications of NMR spectroscopy to molecular and structural biology, inter- and intra-domain dynamics in multi-domain protein systems, computer modeling of protein dynamics, bioinformatics and genetics, simulations of electromagnetic wave propagation in a living tissue, theory of relaxation and transport in soft-condensed matter, dielectric properties of soft-condensed matter, glass-forming liquids, polymers and biopolymers, time domain and broadband frequency domain dielectric spectroscopy, theory of dielectric relaxation, fractional calculus.

PROFESSIONAL POSITIONS

National Institutes of Health, Bethesda, Maryland, USA

NRC fellow, Center for Information Technology,
Division of Computational Bioscience 2007 - present

Purdue University, West Lafayette, Indiana, USA

Postdoctoral Research Associate, Department of Chemistry 2006 - 2007

Developed a model of random quasi-evolutionary process, which explains statistics of exon size distribution in real genomes and reveals two distinctive classes of exons with different evolutionary history.

Elaborated a new method for accurate accounting of protein rotation diffusion in Molecular Dynamics trajectories.

Designed a new type of electrophoretic gels with colored stacking part.

University of Maryland, College Park, Maryland, USA

Postdoctoral Research Associate
Center for Biomolecular Structure and Organization 2003 - 2006

Developed a new efficient and fast computational approach for evaluation of protein rotation diffusion tensor, which is 500 times faster than conventional HYDRONMR family programs.

Suggested a new concept of assembling multi-domain protein structures using experimentally measured components of diffusion tensor as constraints for protein structure elucidation.

Developed a method for characterization of inter-domain mobility in multi-domain proteins using NMR relaxation and residual dipolar coupling data. In application to a two-domain di-ubiquitin protein, the method revealed dynamic equilibrium between three distinctive conformation states of the molecule, which are controlled by charge state of Histedine residue.

The Hebrew University, Jerusalem, Israel

Postdoctoral Research Associate
School of applied science, Laboratory of Dielectric spectroscopy 1999 - 2003

Proposed the model of non-monotonous relaxation kinetics in confined systems. The model found numerous applications for porous samples, like silica-glasses and porous silicon, polymer micro-composites, confined liquid crystals, and folding kinetics of biopolymers.

Created frameworks for explanation of symmetric and asymmetric broadening of dielectric

relaxation spectra, which opened the possibility to characterize conformation states of polymer molecules in micro-composites, melts and solutions using dielectric spectroscopy.

Investigated and analyzed relaxation behavior of mixtures of associated liquids for the model system of glycerol/water mixtures in the whole range of mixture compositions and extremely wide frequency band and temperatures intervals. Discovered universal behavior of associated mixtures caused by formation of joint dynamic clusters of glycerol and water molecules. For the first time characterized relaxation behavior of glycerol crystalline phase.

Conducted numerical calculations of penetration of electromagnetic wave into living tissue.

Created the model of polarization and interaction between cloud droplets with the purpose to evaluate effect of electrostatic charge on cloud microphysics.

Investigated theoretical aspects of Fractional Calculus in application to dissipative problems. Analyzed asymptotic behavior of two different formulations of anomalous diffusion problem.

Institute for Mechanics and Engineering
Kazan Scientific Center, Russian Academy of Sciences, Kazan, Russia

Research Associate
Laboratory of Underground Hydrodynamics 1996 - 1999

Studied theoretical aspects of multi-component filtration in porous and fractured reservoirs. Investigated the effect of harmonic pressure wave on commercial oil production.

The Hebrew University, Jerusalem, Israel

Visiting Scientist
School of Applied Science, Laboratory of Dielectric spectroscopy 12/1997 – 03/1998

Created a model of relaxation and dynamic percolation in micro-emulsion systems.

EDUCATION

Kazan State University, Kazan, Russia

Ph.D. in Theoretical Physics 12/1996

Thesis: "Relaxation and transport processes in self similar media"

Advisor: Professor R. R. Nigmatullin

M.S. in Theoretical Physics 05/1993

Thesis: **"**Investigation of nonexponentional relaxation law of luminescence**"**

Advisor: Professor R. R. Nigmatullin

RECOGNITION

National Research Council Research Award 2007
Research associateship at *National Institutes of Health, Center for Information Technology, Division of Computational Bioscience*

Invited Publication 2006
in special issue on *Fractals, Diffusion and Relaxation in Disordered Complex Systems* of *Advances in Chemical Physics Series, Chapter 1*

Invited Publication 2002
in special issue on *Strange Kinetics* of *Chemical Physics* journal

Invited Publication 2002
in contributed volume *Scaling and Disordered Systems*

Travel award Gordon Research Conference "Water and Aqueous Solutions" 08/2002

The Lady Davis Fellowship for postdoctoral researches 1999 – 2001
In The Hebrew University of Jerusalem, Israel

Cover Story in interdisciplinary scientific journal "Priroda" (in Russian) 2/1998

PUBLICATIONS

Thirty Five peer reviewed journal papers in *Journal of the American Chemical Society*, *Nucleic Acids Research Physical Review B*, *Physical Review E*, *The Journal of Chemical Physics*, *Journal of Physical Chemistry B*, *Proteins*, *Physica A*, *Journal of Non-Crystalline Solids*, *IEEE transactions* and others; The first author in **Nineteen** peer reviewed journal papers; **Five** invited lectures; **Three** invited publications in special journal issues devoted to problems of glass-forming state and strange kinetics phenomena including *Chapter 1 for Special Issue of Advances in Chemical Physics Series*, 2006, John Wiley & Sons, Inc. **Four** patents; **Eleven** papers in conference proceedings volumes; **Seven** oral talks and **Twenty Three** poster presentations

TEACHING

Statistical Mechanics, over 100 students 1999
Department of physics, Zelenodolsk Campus, Kazan State University, Russia

Classical Mechanics II, over 100 students 1999
Department of physics, Zelenodolsk Campus, Kazan State University, Russia

Classical Mechanics I, over 20 students 1994
Department of physics, Kazan State University, Russia

Advanced Physics for gifted high school students, 1992 - 1998
Preparatory school for University applicants, Department of Physics
Kazan State University, Russia

Advanced Mathematics for gifted high school students, 1992 - 1998
Preparatory school for University applicants,, Department of Physics
Kazan State University, Russia

ADDITIONAL INFORMATION

Computer Skills: MATLAB, C/C++, Pascal, Fortran77/90/95, LaTeX, Windows, Linux
Languages: fluent in English, native Russian
Citizenship: Russian Federation, US permanent resident status given on the basis of extraordinary abilities.
Business administration:
Head of Preparatory School for University applicants, 1998 - 1999
Department of Physics, Kazan State University, Russia

REFERENCES

Available upon request